The following is a complete set of the claims for this patent application, replacing all prior versions.

Claims:

Claim 1 (currently amended): An alloy carbon steel comprising iron and a maximum of 0.35% by weight of carbon, said alloy carbon steel having a triple-phase microstructure comprising ferrite crystals fused with martensite-austenite crystals, said crystals having grain sizes within the range of about 2 microns to about 100 microns, said martensite-austenite crystals comprising laths of martensite alternating with thin films of austenite, said martensite-austenite crystals ~~austenite and~~ constituting from about 5% to about 95% by weight of said triple-phase microstructure, and said martensite-austenite crystals devoid of carbide precipitates at interfaces between phases.

Claims 2-3 (canceled)

Claim 4 (original): An alloy carbon steel in accordance with claim 1 in which said martensite-austenite crystals constitute from about 15% to about 60% by weight of said triple-phase microstructure.

Claim 5 (original): An alloy carbon steel in accordance with claim 1 in which said martensite-austenite crystals constitute from about 20% to about 40% by weight of said triple-phase microstructure.

Claim 6 (original): An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.01% to about 0.35% by weight of said triple-phase microstructure.

Claim 7 (original): An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.03% to about 0.3% by weight of said triple-phase microstructure.

Claim 8 (original): An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.05% to about 0.2% by weight of said triple-phase microstructure.

Claim 9 (original): An alloy carbon steel in accordance with claim 1 further comprising silicon at a concentration of from about 0.1% to about 3% by weight of said alloy composition.

Claim 10 (original): An alloy carbon steel in accordance with claim 1 further comprising silicon at a concentration of from about 1% to about 2.5% by weight of said alloy composition.

Claim 11 (original): An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.03% to about 0.3% by weight of said triple-phase microstructure, said alloy carbon steel further comprising silicon at a concentration of from about 0.1% to about 3% by weight of said alloy composition.

Claim 12 (original): An alloy carbon steel in accordance with claim 1 in which said carbon constitutes from about 0.05% to about 0.2% by weight of said triple-phase microstructure, said alloy carbon steel further comprising silicon at a concentration of from about 1% to about 2.5% by weight of said alloy composition, and containing substantially no carbides.

Claim 13 (withdrawn): A process for manufacturing a high-strength, corrosion-resistant tough alloy carbon steel, said process comprising:

(a) forming an alloy composition comprising iron and at least one alloying element comprising a maximum of about 0.35% by weight of carbon in proportions selected to provide said alloy composition with a martensite transition range having a martensite start temperature of at least about 300°C;

(b) heating said alloy composition to a temperature sufficiently high to cause austenitization thereof, under conditions causing said alloy composition to assume a homogeneous austenite phase with all alloying elements in solution;

(c) cooling said homogeneous austenite phase sufficiently to transform a portion of said austenite phase to ferrite crystals, thereby forming a two-phase microstructure comprising ferrite crystals fused with austenite crystals; and

(d) cooling said two-phase microstructure through said martensite transition range under conditions causing conversion of said austenite crystals to a microstructure containing laths of martensite alternating with films of retained austenite.

Claim 14 (withdrawn): A process in accordance with claim 13 in which step (d) comprises cooling said two-phase microstructure at a rate sufficiently fast to avoid the occurrence of autotempering.

Claim 15 (withdrawn): A process in accordance with claim 13 in which step (d) comprises cooling said two-phase microstructure by contact of said two-phase crystal structure with water.

Claim 16 (withdrawn): A process in accordance with claim 13 in which step (c) comprises cooling said homogeneous austenite phase to a temperature of from about 750°C to about 950°C.

Claim 17 (withdrawn): A process in accordance with claim 13 in which step (c) comprises cooling said homogeneous austenite phase to a temperature of from about 775°C to about 900°C.

Claim 18 (withdrawn): A process in accordance with claim 13 in which said carbon constitutes from about 0.01% to about 0.35% by weight of said alloy composition.

Claim 19 (withdrawn): A process in accordance with claim 13 in which said carbon constitutes from about 0.03% to about 0.3% by weight of said alloy composition.

Claim 20 (withdrawn): A process in accordance with claim 13 in which said carbon constitutes from about 0.05% to about 0.2% by weight of said alloy composition.

Claim 21 (withdrawn): A process in accordance with claim 13 in which said alloy composition further comprises silicon at a concentration of from about 0.1% to about 3% by weight.

Claim 22 (withdrawn): A process in accordance with claim 13 in which said alloy composition further comprises silicon at a concentration of from about 1% to about 2.5% by weight.

Claim 23 (new): An alloy carbon steel in accordance with claim 1 in which grain sizes are within the range of about 5 microns to about 30 microns.